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Plant of the Arlington, Mass., Gas Light Company.

By W. B. Conant.

The graphic demonstration of the fact that a gas works can be an attractive feature of a community is found in the case of the new plant of the Arlington Gas Light Company, Arlington, Mass. This plant, located as it is in the residential district of a high-class suburban town, called for architectural attractiveness.

There are four principal buildings, besides relief holder, oil tank and concrete purifier, the structure being of antique brick with tiled roofs that suggest the Spanish mission design.

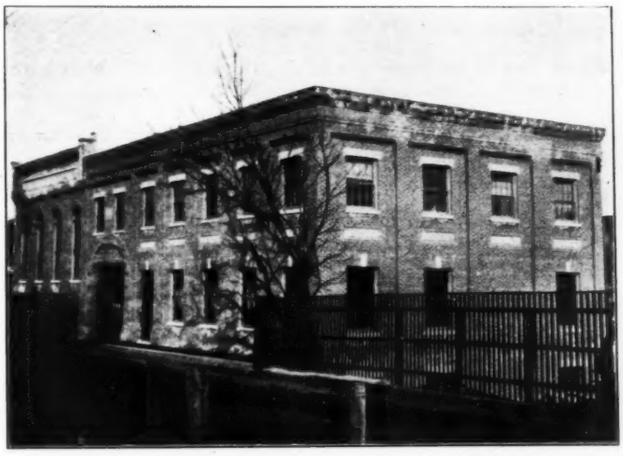
Fronting on Grove street is the two-story meter and office building, which also has a storeroom for appliances, a meter repair room, and a well-equipped pipe shop in the basement. The station meter room is large enough to contain two 10-foot wet-type meters and a district governor. Lockers and shower baths are provided for employees.

The operating buildings are ranged about a courtyard, which is entered by a passageway through the office building, this giving a means of checking up all traffic in and out of the plant. The manufacturing building contains the boiler, blower and water gas room, in the latter there being 7½ foot U. G. I. water gas set, with a capacity of 1,000,000 cubic feet per day. In the blower room are two turbo blower units, two exhauster units, each of 1,400,000 cubic feet daily capacity, oil pumps and boiler feed pumps, and feed water heater.

The boiler room contains two 166-hp. tubular boilers, which are sufficient to meet requirements for some time to come.

The concrete tar separating tank is designed not only to separate tarry matter, but also to percipitate and filter out all solids, leaving the outflow water harmless. The relief holder is of 100,000 cubic feet capacity, single lift.

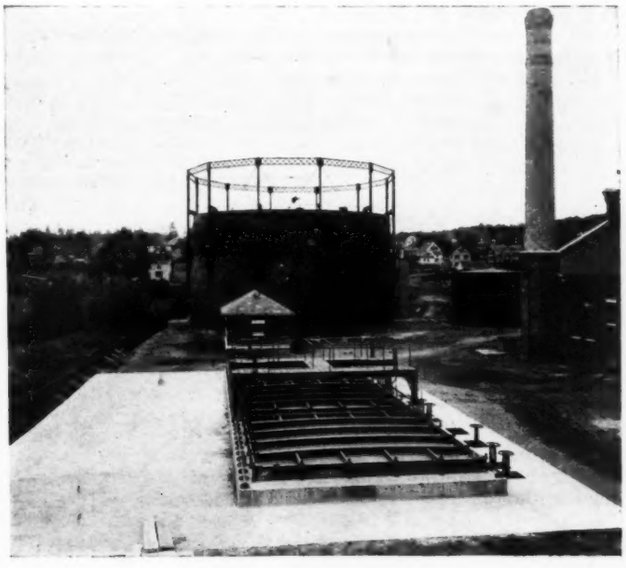
The oil tank has a capacity of 100,000 gallons. There are purifiers, constructed of reinfored concrete, only about 18 inches showing above ground level. The covers are of iron and lifted by means of a Gantry crane.



The Office and Yard Entrance.

The drip pumping system at the plant is both novel and efficient. All the yard drips empty automatically into a concrete tank, from which the drippage is pumped by an electrically-driven centifugal pump to the separating tank, no manual labor being used. The

Generator House, Exhauster Room and Boiler House.



The Concrete Purifiers.

water gas tar is pumped from the separating tank to the storage tanks by the same pump.

The Garage.

At one side of the yard is a brick, tile-roof garage, with 5 iron doors, capable of housing 5 trucks or other automobiles.

From the plant the gas goes under high pressure to three storage holders at Mystic street, the site of the earlier plant, which proved inadequate for the constantly growing demand for gas.

From these holders not only Arlington, with a population of about 12,000, but also Winchester, Belmont and a part of Watertown, are supplied. The Lexington Gas Company, under the same general management as the Arlington Company, is also supplied from here. In these towns, as well as at Arlington Center and Heights, either a store and an office or an agency is maintained, where customers may contract for service, pay bills, or purchase ranges and supplies. The total number of customers served is now over 5,300.

The growth of the company's business during the past 10 years is shown by the following manufacturing figures:

1906	18,478,000	cubic feet.
1907	20,901,000	" "
1908	23,308,000	" "
1909	26,103,000	" "
1910	34,881,000	" "
1911	47,618,000	" "
1912	60,872,000	" "
1913	72,950,000	" "
1914	82,046,000	" "
1915	99,126,000	" "

The company is one of the Massachusetts Lighting Companies, and is under the general management of the Gas and Electric Improvement Company, Boston. Guy K. Dustin, president; Mr. F. A. Woodhead is the local manager.

The Illuminating Engineering Lecture Course.

DR. LOUIS BELL.

In 1910 the Illuminating Engineering Society in co-operation with the Johns Hopkins University gave a course of lectures on Illuminating Engineering, which went far toward placing before the public the general principles of the art. In the 6 years which have since elapsed there have been many changes in methods, improvements in apparatus, and developments in theory, which seem to call at the present time for another effort at education in illumination.

The course now being inaugurated is the result again of co-operative effort, and is to be given by the Illuminating Engineering Society under the auspices of the University of Pennsylvania.

Its scope is intended to be somewhat different from that of the first course of lectures in which the principles of an art and its applications had to be laid down, substantially for the first time, in a general course of instruction. The present course is directed specially toward the practical application of these principles to the work of illuminating engineering as carried on to-day by the latest methods and with the most recent equipment. It ought to appeal with particular force not only to the engineer, but to those whose contact with illuminating engineering is chiefly commercial. It should impress upon those, who in their daily task have to deal with the application of artificial light, a firmer grasp of advantageous methods and a closer understanding of the things which are necessary to make gas and electricity of the maximum usefulness to the consumer. When a solicitor goes out to sell the output of an illuminating company the closing of a contract is only part of his work. Selling gas or electricity is not like selling an article of commerce of which everybody knows the appropriate uses. It is selling service as well, and the quality of this service depends in very large measure on the effectiveness with which it is applied to the customers' uses.

The present series of lectures ought to be of direct and great importance in inculcating the appropriate and wise use of illuminating appliances, and should be therefore especially valuable to those who are dealing directly with the problem. The theoretical side of illuminating engineering will not be neglected, but to increase its practical usefulness to the public is a fundamental purpose of the course.

The following preliminary list of subjects for the Illuminating Engineering Society-University of Pennsylvania lectures has been issued:

PRELIMINARY LIST OF SUBJECTS FOR I. E. S.—U. OF P. LECTURES.

General.

The Principles of Interior Illumination (2 lectures).
The Principles of Exterior Illumination.
Color in Lighting.
Architectural and Decorative Aspects of Lighting.
Recent Developments in Electric Lighting Appliances.
Recent Developments in Gas Lighting Appliances.
Modern Lighting Accessories.

Special Lectures on Interior Illumination.

The Lighting of Factories, Mills and Workshops.
The Lighting of Offices, Stores and Show Windows.
The Lighting of Schools, Auditoriums and Libraries.
The Lighting of Churches.
Theatre lighting (including stage lighting) and the lighting of Art Museums.
The Lighting of the Home.
Train Lighting.

Special Lectures on Exterior Illumination.

Street Lighting (2 lectures).
The Lighting of Yards, Docks and Other Outside Works.
Headlights, Search Lights and Projectors.
Sign Lighting.
Building Exterior, Exposition and Pageant Lighting.

The price of tickets for the lecture course has been fixed at $25.00 which includes admission to all lectures and functions connected with the lecture course and reprints of the lectures. Those interested can obtain further details by writing to Mr. P. S. Millar, 80th street and East End avenue, New York City.

Rust Deposits in Gas Mains and Services.

From paper by A. F. KERSTING, to the Southern Gas Association.

This subject aroused the interest of the writer and his Company owing to complaints of poor pressure, which we found were often due to a collection of rust in the service risers and service extensions. The peculiar house construction in Mobile, where there are practically no cellars, and the great number of residences built of frame on brick pillars, results in the exposure of these connections to atmospheric temperatures. It has been our practice to set black meters under the house at the service riser, and owing to the effect of low temperature on the gas passing the meter we have found rust in the valve chambers. In Mobile our winter temperature often reach freezing, and several times each season a minimum temperature of 24° is experienced for one to three days at a time.

Our experience with rust in mains is practically negligible, and in most cases it occurs only in the very old 2" and 3" cast iron gas mains laid quite shallow.

The stoppage due to rust in the service risers is generally associated with deposits of napthalene, and the deposits were nearly always found at the bottom of the riser, where the service is often less than a foot deep. We frequently found the rust in the shape of the interior skin, the pipe, no doubt, dislodged from the riser pipe when jarred.

This kind of poor pressure complaint was experienced sufficiently often to cause us to contemplate its possible future development, and we, therefore, undertook to look for the cause with a perfectly open mind.

The writer enlisted the assistance of Mr. George G. Ramsdell, Secretary of the American Gas Institute, with the request that the Information Bureau make a report as to causes underlying rust deposits.

Doubtless you have read the article in the "Gas Institute News" for March, 1915, but since it deserves special attention I repeat their report.

"QUESTION 345—RUST DEPOSITS."

Q. "Can some member suggest the underlying cause of this class of stoppage, and the effective means of remedying it?"

A. There are four known causes for rust deposits in house piping:

1. When piping is installed and not capped; there is the effect of the air moisture on the piping, the same as any iron exposed to the atmosphere; and if the piping is unused and left open for a considerable time there will be considerable rust formed. The effect is always obtained when houses are unoccupied and the meters disconnected. Piping should be capped when installed, and also when the meter is removed; and rules to pipe fitters and jobbers should be enforced in this respect.

2. There is the corrosion of iron by moisture condensed from the gas in the cold house piping. It is known that iron will corrode in any water that contains dissolved gases or substances which give it the power to conduct electricity. Such a condition exists when moisture condenses from the gas in pipes, and a generally accepted theory is that the film of water in contact with the metal of the pipe forms innumerable electrical cells, resulting in the solution of the iron and subsequent deposition or precipitation in the form ordinarily classed as "rust."

3. Iron carbonyl undoubtedly plays a part in the forming of rust in house piping—probably not as much of late years as when it was first discovered. From 1890 to 1900 a great deal of trouble was experienced from this compound, principally because the oxide of iron used for purification at that time was not properly made; but of late years, with the superior material that can be bought, trouble from this cause has been largely done away with.

This subject was brought before The American Gas Light Association in 1897, by two papers, one by Mr. Paul Doty, on "Burner Stoppages," and the other by Mr. F. B. Wheeler, on "Rust Deposits."

4. Another very important, possibly the most important cause for rust in house piping, is the cyanogen in the gas. Following is a report by Henry J. Williams, chemist, made at the request of Mr. Waldo A. Learned, manager of the Newton and Watertown (Mass.) Gas Light Company:

"I have conducted a careful investigation to ascertain the composition of the sample of powdery 'rust,' brought me for examination August 27th. I understand that this material accumulates in the ½" gas pipe of lamp posts, two or three miles from the gas works, and that it clogs and stops these up; also that the difficulty is not confined to any one spot, but occurs at a number of places widely separated from each other; that it has in all cases been observed to occur in old pipes, and that no deposit occurs at or near the burners.

"The powder seemed quite dry, and had the appearance of small flakes of iron rust, but had a strong odor of gas tar.

"A quantitative analysis revealed the large quantities of nitrogen in the form of cyanogen, a notable amount of ammonia gas, much combined water, and traces of carbonic acid gas, besides the main constituent, oxide of iron. Small amounts of hydrocarbons appeared to be present, but no evidence of carbonic oxide could be obtained, such as might be expected if iron carbonyl compounds were present. If any carbonic oxide or carbonyl compounds are present, they are in such small quantities as to be insignificant.

"A quantitative anaylysis of the material was made and a combustion or ultimate analysis, with the following result:

	Per Cent.
Water	17.58
Insoluble matter	0.62
Iron	56.45
Carbon, total	3.38

"Besides these, much ammonia, and cyanogen suggesting the presence of ammonium ferrocyanide. The amount of this was determined in the form of Prussian Blue. Combining all the information obtained by the various analysis, I find the composition of the material as follows:

	Per Cent.
Insoluble matter	0.62
Ferric hydrate	38.44
Sesquioxide of iron	48.70
Ammonium ferrocyanide	11.36
Carbon	0.50
Hydrogen	0.23
Undertermined	0.15
	100.00

"The 0.5% of carbon present appears to be combined, in the form of hydrocarbons and as carbonic acid gas.

"It is evident, therefore, that the deposit is primarily formed by the rusting of the interior of the iron pipes, under the influence of moisture, of which 9.70% as combines to form 38.44% of hydrate of iron. The rest of the water found comes from ammonia in the ammonium ferrocyanide and from the small amount of hydrogen. At some stage in the formation of hydrate of iron, ammonia gas and cyanogen gas, in the presence of reducing hyrocarbons, re-act upon some of the hydrate of iron, giving rise to the formation of ammonium ferrocyanide.

"The chief cause of this formation is, in my opinion, the moisture present in the gas, contributed to, to some extent, by the ammonia gas and cyanogen present, either free or combined, but probably free.

"All the efforts made to remedy the trouble should, I think, be directed towards the prevention of the moisture, ammonia and cyanogen escaping in the gas from the purifiers, as they now do.

"It is difficult to say, even in any special case, how much rust is due to any particular cause. Probably there are no two cases in which the effect is the same. BUREAU OF INFORMATION."

Coincident with the report of the Institute, our company inaugurated experiments to determine the cause of rust deposits, as well as a remedy. We sent samples of rust to the Pittsburgh Testing Laboratory, and to Professor E. S. Merriam, of Marietta College, and furnished them copies of the report of the Institute, with the request that they make complete chemical analysis, and offer suggestions as to cause and remedy.

The analysis and report of Professor Merriam is as follows:

	Per Cent.
Moisture and loss at 100° C.	2.77
Ammonium Ferrocynide	1.65
Prussian Blue	2.52
Ferric Oxide	82.40
Silica	0.12
Ether, soluble matter	0.58
Free Carbon (graphite)	1.62
Combined Water	10.33
	101.99

"The rusting of iron is ordinarily due to the combined action of water, air, and a substance of a more or less acidic nature. This last substance is generally carbon dioxide. Different kinds of iron rust at different rates; perfectly pure iron hardly at all, while ordinary cast iron rusts very rapidly. Water seems to be the most active agent in causing rusting, as almost any sort of iron will not rust if the atmosphere around it is perfectly dry.

"Iron placed in pure water free from oxygen and carbon dioxide, will go into solution very slowly. If carbon dioxide is present but no oxygen, the iron will be attacked more rapidly, forming a solution of ferrous bicarbonate. If oxygen is now admitted to the solution, the ferrous bicabonate will be oxidized to insoluble ferric hydroxide, or rust, and the carbon dioxide previously combined is set free and can again attack the iron. In this way a large amount of iron can be attacked and rusted by a small amount of carbon dioxide.

"Anything that will remove the ferrous salts in the solution will facilitate the rusting of more iron. Cyanogen is able to do this by combining with dissolved iron to form a ferrocyanide, and this change will be further favored if a basic substance like ammonia is also present.

"As iron pipe generally rusts irregularly, the iron being attacked strongly at some points rather than over the whole surface. This is practically the same thing as "local action" in an electrical battery. Impurities in the surface of the iron, such as particles of carbon, may act as the positive pole of a battery of which the other pole is the iron, so that a real process of electrolysis may take place, resulting in the oxidation of the iron Just as "depolarizers" help a battery to work, so oxygen in the water may act as depolarizers and favor electrolytic effect and promote rusting.

"It would seem that water is the main cause of the excessive rusting in this case, assisted by the presence of oxygen in the gas."

The report of Mr. H. H. Craver, Chief Chemist of the Pittsburg Testing Laboratories, is as follows:

	Per Cent.
Moisture	2.77
Silica	2.08
Iron Oxide	73.20
Ferrous Ferrocyanide	3.05
Manganic Oxide	0.46
Calcium Carbonate	0.48
Magnesium Carbonate	Trace
Ammonium Sulphate	1.13
Ammonium Nitrate	Trace
Organic Matter and Combined Water	11.0
Iron Sulphate	Trace
	99.17

NOTE.—Percentage refigured to same moisture content as Merriam report.

"The results indicate that the material consists chiefly of iron oxide with small amounts of complex ferro cyanide, combined water, silica, manganic oxide, ammonium sulphate and a trace of ammonium nitrate. Furthermore, they indicate that the small amounts of cyanogen and sulphur compounds carried along with the gas have attacked the iron, forming either comparatively unstable or acid iron salts. These comparatively unstable compounds tend to break down the more stable ones, such as hydrate, with the liberation of the acid radical, which is ready again to go through the cycle of changes attacking the iron. Naturally the gas constantly carries the active agents of corrosion, and while the amount is small the accumulation over a long period of time will be considerable and will doubtless result in a more rapid disintegration of the iron pipe."

Referring to the above four reports, would say that our deposits were in closer harmony with the fourth cause given by the Information Bureau, the combining effect of moisture, cyanogen, and probably minute traces of ammonia.

It will be noted in the two analyses of our samples that cyanogen was the outstanding corrosive element, which was made very active by moisture condensed from the gas in the exposed pipes.

MANUFACTURING CONDITIONS.

Analyses of our gas at the outlet of the holder during April, 1915, showed cyanogen ranging from five to twelve grains per hundred cubic feet and ammonia from one to two and a half grains. The gas was straight coal gas made in inclined retorts under moderately high heats. Water gas is added intermittently during peak loads only through the winter. Our average rate of make is 30,000 cubic feet per hour. This gas after secondary condensing to about 70°, is scrubbed through a series of apparatus consisting of a three stage washer box and two tower scrubbers; the water from the last scrubber being circulated in two stages back through the foul gas to the wash box. This is followed by two concrete purifiers 25′ square, each containing 3000 bushels of oxide. We realize that the temperature of the gas in the scrubbers is not as low as could be desired, but this is controlled by the water obtainable.

Experiments in a miniature scrubber in which the gas was cooled by ice to 60° gave a cyanogen extraction more complete than in our regular scrubbers.

In considering the influence of the purifying material as a cyanogen remover, we found that with a third box in series we were able to extract a much greater percentage of the cyanogen; and that when the gas was freed of hydrogen sulphide in the first two boxes and with the third box previously fouled to a certain extent, that the cyanogen was materially reduced.

We found different grades of commercial oxide had varying affinity for cyanogen, and from this experiment we were able to select an oxide that had the highest degree of usefulness in this respect.

REMEDY.

As a result of our experiment we feel satisfied that we have found a practical remedy for the excess cyanogen; and have arranged for the installation of a third purifier of equal capacity to the old ones, with connections that will permit reversal of flow to utilize the sulphided oxide for this extraction. Even without considering the cyanogen problem, the third box in any case will prove a justifiable investment, for the reason that the purifying material can be worked to its capacity without courting the hazardous limit of sulphide saturation which would allow foul gas to pass the purifiers.

Throughout the above analysis and reports, moisture is constantly referred to as being the initiator; and it is the writer's conviction that if the gas were so treated as to not deposit moisture on exposure, the corrosion would be practically eliminated. This matter of dry gas was ably discussed by Mr. Irwin Butterworth in a paper on "Prevention of Stoppage in Services, Meters, and House Pipes During Cold Weather" before the Western Gas Association in 1905. In his paper the influence of condensed moisture as a cause of deposits of napthalene was proven, and various suggestions for drying the gas was offered. An air or water condenser on the gas leaving the holder, to bring the temperature down to approximate the lowest temperature met in the distribution system, would seem to be the most feasible.

From this information, therefore, we can appreciate that dry gas would have manifold blessing, preventing naphthalene, as well as corrosion. Our company has given this matter of temperature reduction careful thought, and is seriously contemplating the advisibility of installing means to secure this result.

While this paper deals only with the inimical effect of cyanogen it is, of course, known that this constituent has great value when it can be extracted in commercial form. A paper on "Cyanogen Recovery" by Mr. M. E. Mueller before the American Gas Institute, 1910, showed that for the larger plants such extraction could be operated with profit

CONCLUSION.

As shown above, we have decided that the third box will materially correct the corrosive influence; and perhaps drying the gas will be resorted to as a further preventive.

To counteract possible stoppages in service pipes, we are now using galvanized pipe for our service risers, because this pipe has been shown by our experiments to be less susceptible to corrosion. We also put full size crosses at the bottom of risers with ample drip pockets, so that stoppage of the pipe will be postponed.

To protect our meters from low temperatures and possible de-

velopment of corrosion, we are now endeavoring to place them inside the house. Where meters can not be so located we plan to use a simple asbestos jacket that will insulate them against the lower temperatures.

The chemical research made by us was conducted by our Mr, J. W. Lansley, a graduate chemical engineer, and the following appendix by him will add materially to the value of this discussion.

Supplement to Paper on Rust Deposits.

By J. W. Lansley.

This is written as a supplement to Mr. Kersting's paper on "Rust Deposits in Gas Mains and Services," in hopes that any who may wish to proceed further into this subject may profit by some of our mistakes and difficulties.

The method used in determining the cyanogen quantitatively was as follows: To test for cyanogen in gas put 15 c.c. of a 10% ferrous sulphate ($FeSO_4$, $7H_2O$) solution into each of three wash bottles. Add 15 c. c. of 20% caustic potash solution to each bottle and pass about 3 cubic feet of gas through at the rate of about 1 foot per hour. Rinse the contents of the bottles into a beaker; add 20 c. c. more of caustic potash solution and heat to boiling. Filter and wash with hot water until a few drops of the filterate no longer show a blue color when acidified and tested with a drop of 1% ferric chloride solution. Transfer the filtrate to a 500 c. c. graduated flask, dilute to the mark and shake well. Take 100 c. c. of this solution and transfer to a beaker by means of a pipette. Slowly add dilute sulphuric acid (sp.gr. about 1.5) stirring constantly until the solution becomes slightly acid toward litmus. Then run in the zinc sulphate solution, a few drops at a time, until the drop test shows that the ferrocyanide is all percipitated. From the quantity of zinc sulphate solution used the cyanogen in the gas is calculated.

A qualitative test may be made by acidifying the solutions in the wash bottles, after the gas has been passed through them, with sulphuric acid. If cyanogen is present in the gas a blue precipitate (Prussian Blue) will be found. In some cases no precipitate appears immediately, but the solution will turn a light green in color, denoting the presence of cyanogen, but in such case it is best to run a fresh test, using twice the quantity of gas.

In connection with the simultaneous tests for cyanogen at various points in the purifying train, several difficulties were encountered. In one case the gas showed an apparent increase in cyanogen after the last scrubber. This was shown to be due to the following fact: Before the wash-box a large amount of ammonia and hydrogen sulphide is still in the gas. The action of these and of the cyanogen upon the metal connections to the meter was in some cases sufficient to cause an error of 60 to 80%. When, however, the ammonia had been reduced to not exceeding 2 grains per 100 feet of gas, the meter may safely be placed at the inlet of the bottles. Care must be taken to prevent condensation accumulating in low points of the connections, as if such happens the cyanogen is removed in part, and appears in the condensation as ammonium thiocyanate. Condensation in meters out in the city when tested for thiocyanates, showed their presence, although in but a small quantity.

In order to have knowledge of the behavior of cyanogen towards various oxides, a series of tests were made with sets of three small purifying boxes. They were filled with various oxides, and the rate of flow of the gas was adjusted to be nearly as possible in proportion to to the flow in the large boxes. Daily quantitative tests were made for H_2S and cyanogen at the outlet of each box, and for the oxygen in the gas entering the boxes.

Without going into detail, the following general observations were found to hold true for all the oxides:

1. The gas tested at the outlet of the first box showed no cyanogen until the box was sufficiently fouled to give a pronounced stain on lead acetate paper.

2. The oxygen entering the boxes undoubtedly plays an important role in governing the amount of cyanogen removed. In several cases when the oxygen content was high for some days, the following condition was observed when the first box was fouled and the second partially so:

Cyanogen could be detected at the outlet of all three boxes. Yet from previous facts it would be supposed that all the cyanogen would be removed by the second box. Along with this it was found that revivification of the oxide in box 2 was proceeding at the same rate as the fouling. The last box, in which no sulphide had been found, was placed first for a day and then returned to its position at last. Cyanogen still showed at the outlet of the second box but none at the outlet of the third box. Iron oxide has little affinity for cyanogen, and its direct combination with oxide occurs to a very slight extent; but ferrous sulphide and cyanogen react readily and form the various double iron cyanides always found in spent oxide. Yet ferrous sulphide in the presence of an excess of hydrogen sulphide loses much of its affinity for cyanogen.

Upon these facts the following rough theory was formed to account for the peculiar behavior of the oxide when the oxygen content of the gas was high. The outlet of box No. 1 showed cyanogen due to an excess of H_2S present. This hydrogen sulphide was completely removed in box No. 2. But owing to revivification taking place as rapidly as the fouling, the sulphide has no opportunity to act on the cyanogen, and hence a portion passed over into box No. 3. Box No 3 failed to remove this cyanogen since no sulphide had yet been formed in it. When, however, a portion of its oxide had been fouled by placing it first for a time, the removal of the cyanogen could be accomplished.

This theory, while fitting all the facts that came under our observation, is but rough. Conditions of temperature and alkalinity of the oxide and various other factors might render it entirely wrong. Sufficient equipment and time were not at our disposal to go further into it. If the theory is correct, cyanogen troubles can be largely cured by observing two things: First, a careful rotation of boxes, always keeping the last box partially fouled, but never permitting a stain to show at its outlet: Second, by keeping the oxygen content in the gas as low as is consistent with good practice in the revivification of the oxide in situ.

This last accomplishes a beneficial result in two ways. As will be shown later, oxygen in the gas is the active agent in transforming any ferrous carbonate formed by the CO_2 in the gas, into rust. Lowering the oxygen simply cuts out that much rusting. Besides it helps in decreasing the cyanogen passing through the purifying boxes, and thus lowers corrosion due to the formation of ferrocyanides in the services, etc.

In conjunction with these tests, several samples of pipe were placed under observation. Pipes were $\frac{3}{4}''$ diameter, $20'$ long, and connected in practically horizontal positions and exposed to the weather during February and March. Approximately 200,000 cubic feet of gas at 3,000 cubic feet per day were passed through each pipe, and its condition at the completion of test carefully noted.

The steel pipe was most corroded. The rust taken from it showed much cyanides, and practically no true iron rust.

The wrought iron pipe showed very little rust, but the inside was covered with a blue flake which scaled off with some difficulty.

The galvanized pipe gave the best results, In no place was any corrosion detected. Unfortunately the entire interior of the pipe could not be observed to see what occured at points where the galvanizing was broken.

From available data it seems the formation of "Rust" occurs in several stages, in somewhat the following manner. For iron to rust there must be moisture and some substance of either an acid or salty nature. Pure iron itself is hardly affected, nor is any iron in a solution of an alkali. Nearly any other salt in solution is sufficient to start the reaction, and usually it is cyclic, the salt finally returning to its original condition to aid again in the corrosion. It seems likely that the initial reaction consists in the water and CO_2 in this gas attacking the iron with the gradual formation of a solution of iron bicarbonate. The weak acid H_2CO_3 is sufficient to set up this reaction.

However, any water in mains or services would, after a time, become saturated with the iron bicarbonate, were it not possible for it to be removed and the original H_2CO_3 liberated to attack the iron anew. The cyanogen and the ammonia present in the gas affords this means, as undoubtedly does the small amount of oxygen in the purified gas.

From this point three independent reactions may proceed in the following fashion: First, the iron bicarbonate reacts with the ammonia and cyanogen present, resulting in the formation of ammonium ferrocyanide, at the same time liberating the original H_2CO_3 which had been tied up with the iron. At the same time another part of the bicarbonate undoubtedly reacts with the cyanogen, free iron and gaseous oxygen giving an insoluble blue precipitate called Prussian Blue, and again liberating H_2CO_3. The last reaction, and the one which gives the true red iron rust, is between the oxygen, water, and iron bicarbonate. The products here are ferric hydroxide, and H_2CO_3. There may be a secondary reaction between the ammonium ferrocyanide and the iron, since the ferrocyanide has a solvent action upon iron, and the results in Prussian Blue.

All of these reactions are likely proceeding side by side, and the determining factor in every case is the moisture in the gas, and particularly the amount condensed. This condensation, wherever it may be, speedily becomes saturated with the various gases owing to the large volume of gas passing over them. Moisture present as vapor will aid in the reaction, but the water caught as condensation is a means to the end. This is true of almost any chemical reaction, that substances in solutions tend to react more rapidly and to a greater degree than where merely in contact with each other without the presence of water. In all the tests we have made, the peculiar and striking feature has been that almost no true iron rust is secured by the action of the purified gas upon the iron. In every case the "rust" consists of a blue flaky powder, and always shows the presence of a large amount of ferrocyanide.

Merchandising Lighting Fixtures by the Wilmington, Del., Gas Company.

W. A. Morris.

At Wilmington, we make special efforts to have on display all the latest lighting units that can be obtained, and new numbers are not purchased until some of the slower selling ones are closed out.

The standardizing of fixtures has been our constant aim, and by this we have saved large sums of money.

We buy all our fixtures by what is known as "knocked down," or "unassembled," and find that we are able to wire and assemble not only much cheaper, but usually better, as well as a saving in freight and crating charges.

Displaying.

Wherever it is possible, the lighting display should be on the first floor, even if it be necessary to display domestic fuel appliances or have the clerical department on the upper floors, as lighting fixtures lend themselves to more decorative effects and are more attractive than other appliances.

Then again, lighting is now receiving the greatest competition and is entitled to more prominence of display and thought than other classes of service that we render.

It is our rule to rearrange our entire fixture display frequently, this being done for the purpose of changing the appearance of the room, and carrying out the idea that the rearrangement is necessary so that new designs may be shown; also giving us an opportunity of displaying some of the slow selling fixtures to their best advantage.

Show Windows.

In showing lighting displays in our window, room effects are frequently used; thus a library would be fully furnished showing a ceiling lighting unit, table lamp, and possibly side lights, together with a fire place or gas heater. Sometimes a figure as if sitting in the act of reading; in fact the various rooms for an average house may be followed up in this way, showing the proper lighting effects for each.

It is our belief that well planned and neatly dressed windows offer the best means of advertising obtainable.

Advertising.

We are firm believers in the beneficial results of advertising and aim to have our copy intelligently written, based on a thorough knowledge of our goods and telling the story we want the public to know.

We are considered among the most liberal advertisers of our city, the lighting part of our business receiving its full share.

The Salesman.

The salesman, in order to be successful in selling fixtures, must be a specialist in his line. He must be so fully convinced of the superiority of gas as an illuminant that he can answer all objections that could possibly be raised, in so concise and intelligent manner that he will leave no reason for doubt with his prospective purchaser.

He should be of an artistic temperament, able to suggest harmonious designs, be thoroughly familiar with the various stock articles to be obtained, must be conscientious, must see that his orders are properly executed, and above all, be a salesman.

The Architect.

We do not wish to pose as an authority on this, but it is our candid opinion that the proper efforts have not been made to educate the architect as to the advantages and artistic features of modern gas lighting; at any rate they are not as familiar with it as they are with other illuminants, and it is our duty to see that they receive the proper education.

We are continually advertising in some form or other our display of modern gas lighting fixtures. We talk with our customers of modern lighting fixtures being as essential as modern furniture for the home, and while we do sell a great many lighting units to be installed upon old fixtures, it is our constant aim rather to install new fixtures.

Old Homes.

One of the productive means of advertising that we have used, is the loaning of modern fixtures to our customers for weddings, society events, etc. The notices of these events are carefully scrutinized and the more prominent ones are called upon, prior to the occasion, with the request that we be allowed to look over their lighting, then suggest that we will gladly loan them one or more modern fixtures, which will be removed afterwards without expense to them. The fixtures so installed are rarely removed.

The selling of portable table lamps is another means that we use for furthering the sale of domestic lighting.

The Selection of Fixture Fitters.

In the beginning of our lighting fixture activities we had not in our employ any one who had experience in assembling and hanging combination fixtures, and an outside man was engaged, who was supposed to be familiar with the work. However, he proved a failure, as well as several others of the same class that were tried out, due to their training having been more along the electrical line, and not having had sufficient gas fitting experience or instructions on installing and adjusting modern gas burners.

We train our own men, who were experienced gas fitters in all the requirements of electric wiring, etc., and are able to hang our fixtures at a reasonable cost and in a more satisfactory manner than by hiring special men for combination wo k.

Inspection.

We realize the necessity of keeping in touch with our fixture installation, and, therefore, do not feel that our responsibility is ended when the fixtures are installed and paid for. As soon as the meter is set at a new house, which we have fixtured, the trimmers are sent to burn off mantles, adjust lamps and by-passes, the latter being furnished on all our mantle burners.

The customer is next called upon by the salesman, who demonstrates the quality and convenience of the modern lighting.

Should there then be any question of the supremacy of our lighting, an evening call is made and by an actual comparison, the consumers are usually convinced. This results in the use of gas for the greater part of the lighting. In addition to this preliminary work, we have a crew of men canvassing lighting for about eight months of the year.

Conclusion.

From our experience we are of the opinion that the successful merchandising of lighting fixtures, like that of any other commodity, requires a thorough knowledge of the goods that are handled, and a further knowledge of just what the market affords, as well as an artistic imagination that will enable one not only to recommend fixtures of the best quality, but of harmonious design and decoration to suit the various requirements.

However, the merchandising of lighting fixtures by a Lighting Company differs from the general lines of merchandising inasmuch as the selling of fixtures is only a means to an end; namely, the selling of the commodity.

Therefore while we must have all the necessary qualifications of successful merchants, we must have a thorough knowledge of the merits of gas as an illuminant, as well as all the defects of its competitors; and the conviction that gas does offer superior advantage as an illuminant over all others; and by following these ideas as closely as possible, we owe much of the success we have had in our fixture merchandising.—*Abstract of paper before Pennsylvania Gas Association.*

Goods in Action---Sell.

A. A. LAUGHTON, Manager, Gardner (Mass.) Gas, Fuel & Light Company.

It has long been the conviction of the writer that the lack of facilities in the average gas company's salesroom to display gas appliances, in the proper relation to the usual household furnishings, has a decided unfavorable effect on sales. Oftentimes when the salesman invites the prospective customer to visit the salesroom, the great variety of appliances displayed only adds to the confusion of the prospective buyer and still more retards the securing of the actual order.

With these ideas in mind, and confronted with the problem of laying out the new office of the Gardner (Mass.) Gas, Fuel and Light Company, the "Cottage Comfortable" was designed.

The new office secured was an oblong one, measuring 82 feet by 19 feet. It was found that suitable private offices for the writer and his assistant, together with the general office, could readily be confined in a space measuring 37 feet by 19 feet. This, then, left a space measuring 45 feet by 19 feet, which could be devoted exclusively to the salesroom, and it was in this space that the "Cottage Comfortable" was constructed.

As to the details of the cottage, let us state that it is composed of 3 rooms, which are in their order of location when entering the office, and passing through the cottage, (1) reception room, (2) bath room, (3) kitchen.

The interior of the entire cottage is constructed with beaver-board. In the reception room, this beaver-board is papered, while in the bath room and kitchen it is painted—the bath room being white and the kitchen cream colored. All three rooms have a ceiling built also of beaver-board, and each case painted white. The exterior of the cottage is constructed by use of ordinary clapboards. There is no roof whatever to the cottage, since this does not show. The windows are storm windows—their use being made necessary due to the fact that the walls of the structure are not sufficiently thick to permit of the use of window weights, required by ordinary sliding sashes. The windows are, however, the usual size, as is also true of the blinds. The painting of the exterior is white, and the blinds and other trimmings, including the flower-boxes, are green.

The entire cottage is completely furnished—all of these furnishings being loaned to the company by 14 different local merchants, free of cost, as long as the cottage is maintained. All of the plumbing fixtures of both the bath room and kitchen are connected to three different water heaters, so that hot water may be drawn from any of the six water fixtures of these two rooms. The lighting is accomplished by two C-EZ lights and one portable lamp in the reception room, two Welsbach Jr. lights in the bath room, and one Welsbach Q light in the kitchen. In the kitchen, in addition to the cabinet gas range, tank water heater, sink, etc., is a complete set of kitchen dishes located around the kitchen at convenient points. A folding ironing-board, with a gas iron, is included.

In the reception room are several comfortable chairs and a table upon which are current magazines and books, together with a writing desk properly equipped with paper, pen and ink. On this desk also is a telephone for such patrons as desire its use. Last, but by no means least, a beautiful Edison diamond disc phonograph.

The House Within.

The flower-boxes are filled with flowers that add a personal touch and give a finish to the entire structure. Many visitors were surprised to find growing flowers in a gas company's office, and it was our idea that these flowers would help overcome the prejudice against gas owing to its effect on plants.

At the end of the opening week, it was found that over 5,000 visitors had been entertained, and that a number of orders had been secured. There were many orders covering the particular model cabinet range and water heater installed in the kitchen, which proves that goods displayed in their proper relation to recognized household furnishings do sell more readily.

We feel that every manager and commercial manager should seriously consider their method of displaying goods, and we submit our experience with the "Cottage Comfortable" as showing clearly the assistance which can be offered to the prospective buyer of gas appliances by showing these appliances in the most effective way.

Dehydration of Coal Tar.

The question of whether certain constituents of coal tar have an influence on the dehydration of this material is discussed in "Het Gas," by Heer Petit, in an article describing the combating in a coke oven works of a sort of tar plague.

It is remarked that tar from coke ovens and vertical retorts, being usually very liquid, no especial dehydrating plant is necessary. A few days in a tank generally suffices for the separation of the tar and water by gravity. Until recently, this plan proved quite effective at the Douai coke oven works. There is a dry hydraulic; but the mains are treated with a constant tar flow. From here and all parts of the works, the tar flows to the general liquor tank, and is afterwords pumped into an overhead tank, where it is allowed to settle. In a day's time, the 20 or 30% of water is reduced to less than 5%—the figure being 1 or 2%. Suddenly, however, the water content of the tar, after a day in the tank, was found to be 32%; and after another day had passed, it was still 30%. The introduction of a steam coil into the tank was of hardly any use, as some days later the amount had only fallen off to 28%. Finally, the storage tanks was filled, and it became necessary to dispose of the tar at considerably reduced prices.

For two days the trouble ceased, and then it returned with full intensity. But this time there was some clue furnished by the fact that during this period the saturated tar oil from the benzene works had been pumped into the liquor tank, and the question arose whether this tar oil might not be the cause. In order to arrive at the truth, a portion of dehydrated tar from the normal period was divided into two parts—one part being mixed with 20% of water, the other with 20% of water and 10% of tar oil. After shaking the bottles thoroughly, the contents were allowed to settle for 24 hours in a warm place. It was then seen that the tar mixed only with water had completely separated, the amount of water in it being 2%; while the oiled tar, on the contrary, still contained 17% of water. It was thus obvious that the trouble had been caused by the presence of the tar oil in the tar. After the bad tar had been got rid of, and the tanks had been cleaned out, the trouble completely ceased.

It is certainly very peculiar that such a thing as tar oil, being a normal constituent of coal tar, with very low viscosity, should have such an effect on the properties of tar when added to this liquid. But the fact is of interest to gas works using tar oil, anthracene oil, etc., for the washing out of naphthalene, and afterwards pumping the saturated oil to the general liquor tank. The author advises that it should be stored separately, and delivered from a special tank directly into a tank car.—*Journal of Gas Lighting.*

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The Southwestern Electrical and Gas Association Holds Convention at Galveston, Tex.

From May 17 to 20th the Southwestern Electrical and Gas Association held its 12th Annual Convention at Galveston, Tex., with headquarters at Hotel Galvez. While business conditions have not been the most inviting during the past year, and many of the companies have felt the necessity of economizing to a rather large extent, still the attendance at the convention was very satisfactory and all the sessions were well attended.

The hospitality of the city of Galveston was extended to the visiting delegates by City Attorney Mart H. Royston. Mr. W. B. Head, of Dallas. was called upon for a response on behalf of the Association. For the fourth consecutive year the Southwestern Association has held its convention in this city, and it is almost the unwritten law that as many more conventions will be held in the same place.

The keynote of the address of Mr. David Daly, President of the Association, was enlightenment of the public, so that they might understand the genuineness of the service the utility companies are trying to render them.

While it has been the custom the last four years to hold separate sessions for the members of the companies representing the gas interest, this year a different plan was followed. No special session was held for the gas men; there were, however, many prominent gas men in attendance, including Mr. W. B. Tuttle, of San Antonio, Tex., former President of the Association, and its representative at the International Gas Congress last year.

The following officers will serve the Association this coming year: President, F. R. Slater; First Vice-President, H. C. Morris; Second Vice-President, D. A. Hegarty; Third Vice-President, W. A. Sullivan; Treasurer, J. B. Walker. Mr. H. S. Cooper, it is understood, will be continued Secretary by the Executive Committee. His very efficient and energetic work in behalf of the Association is very much appreciated.

The Galveston Commercial Association gave all those attending the convention a complimentary boat ride around the Bay, and nearly every one present availed himself of this opportunity. Then there was surf bathing, parties for the visiting ladies and some special invitations to points of local interest.

New York Gas Meeters Elect Officers.

The Gas Meeters, New York Section, held the last dinner of the present season at Stewart's Rathskeller, Park Place, New York city, Thursday, May 25th. Mr. Ira G. Brainerd, representing the National Security League, delivered a reminiscent address on "Preparedness."

The election of local officers resulted as follows:

Chairman, A. C. Johnson.

Commissioners, W. A. Buerkle and H. J. Gerlich.

Secretary-Treasurer, E. J. Jacobson, 84 Sip Avenue Jersey City, N. J.

The result gave a representative from the Consolidated Gas Company, Brooklyn Union Gas Company, Public Service Gas Company and the Manufacturers.

Natural Gas Meeting Biggest Ever.

The annual meeting of the Natural Gas Association, held in Pittsburgh, Pa., during the week of May 15–20th, proved to be the most successful ever held. The attendance was a record breaker and the exhibit a pronounced success.

The election resulted as follows: President, J. M. Guffey; Vice-President, G. T. Braden; Secretary-Treasurer, T. C. Jones. Directors, Arthur Booth, F. P. Grosscup, B. C. Oliphant, J. C. Duffield, Arthur Hurlburt and O. K. Shannon. Editor Wrinkle Department, W. Re. Brown. Buffalo, N. Y., was selected as the next place of meeting.

Special English Correspondence.

Monthly Letter from Norton H. Humphrys, Salisbury, England.

GOVERNMENT OFFICIAL AND OTHER RETURNS RELATING TO THE GAS INDUSTRY.—SUBSTITUTES FOR COAL IN THE RETORT HOUSE. —A VALUABLE CONTRIBUTION TO THE NAPHTHALENE PROBLEM.

GOVERNMENT RETURNS 1913.

The Government returns relating to the gas industry in the United Kingdom, for the year 1913, were not issued until within the last month, and their value is discounted by such delay. To a large extent they are anticipated by private enterprise. Nevertheless they are interesting as affording evidence as to the progress of the industry. They include 831 undertakings, of which 519 are the property of Statutory Joint Stock Corporations, and 312 are owned by local authorities. A large number of gas works belonging to government and other public institutions, railway companies, large factories, etc., and small joint stock or individually owned gas works, that do not require parliamentary protection, or cannot afford the heavy expenses incidental to obtaining the same, are not included in the Government return, so the totals shown by it are not complete in respect to the total consumption of coal or other materials, quantity of gas made or sold, number of consumers, etc., and it is the more necessary to emphasize this point, because they are frequently used and quoted as accurate and authoritive on these subjects, The omissions include a large number of undertakings individually small in magnitude as compared with the statutory concerns, and perhaps representing an addition of 10% to the totals above mentioned. As has always been a notable characteristic, all the items show a steady increase when compared with the corresponding ones for the previous year. Many of the larger undertakings run two, three, four or even more separate manufacturing stations, so the figures fall short of the actual number of gas works in the country.

About 100 corporations and 47 local authorities, less than one-fifth of the whole, manufacture carburetted water gas, in proportions ranging up to 50% of the total production, but only a few exceed 30%, and many are provided with a considerable excess of manufacturing plant to admit of varying the proportions of coal gas or carburetted water gas according to the current market values of coal, gas oil and coke. The total quantity of gas produced by the 831 undertakings, amounted to 224,517 millions cubic feet, of which 206,474½ M. were sold and paid for. Nearly 17 M. tons of coal were carbonized, yielding 195,826 M cubic feet of gas, the make per ton of coal being in the neighborhood of 11,525 cubic feet. The output of carburetted water gas was 23,779 M. cubic feet, and 4,912 cubic feet of "other" gas was sent out, the bulk of which was produced by the South Staffordshire Mond (power) Gas Company, The quantity of gas named was supplied through 39,000 miles of main pipes to 7,103,113 private consumers and 741,703 public lamps. Credit customers used 145,728 M.; prepayment consumers took 49,946 M., and the public lighting, 10,802 M. cubic feet of gas. The prepayment class of customers figure separately in the return for the first time. They represent some 22½% of the total quantity of gas consumed, but in number have for some time exceeded the credit department, so the desirability of showing the two classes is evident. The total capital investment is over 162 millions sterling, the receipt 35½ M., the expenditure 28¼ M., leaving a profit of 7¼ M., or about 20% of the annual turnover.

The figures show that the quantity of residual products to be disposed of is by no means insignificant, and warrants the best available skill and continual watchfulness if the whole quantity is to be sold to the best advantage and at top prices. After providing for the retort house and carburetted water gas requirements, there remains a surplus of not less than 7½ M. tons of coke. The production of tar would not be less than 900,000 tons, and of ammonia, the equivalent of 170,000 tons of sulphate. Practically the whole of the ammonia is disposed of in that form. So far as coke and sulphate is concerned, gas undertakings have a fairly open market, and I have repeatedly referred to the excellent work done by the commercial sections attacked to our District Associations of Gas Engineers, the Sulphate of Ammonia Committee and the London Coke Committee. But with regard to tar, the position is anything but satisfactory, recent happenings having placed the market entirely at the control of the purchasers. Current quotations are about 15/ per ton of 190 gallons, and the first thing to be done on the return of normal times, will be to reduce this very serious source of loss.

UNOFFICIAL STATISTICS.

The private or unofficial statistics that are periodically issued, have not only the benefit, as compared with the Government returns, of being reasonably up-to-date, but from a practical point of view, they afford several other advantages. Most of our Parlimentary documents suffer from the prepondrance of the legal element to the exclusion of more practical considerations. As an example of private enterprise we may quote from the volumes of the "Gas World Year Book," published on January 1st, 1915 and 1916, respectively, and in addition to published official reports as issued to the shareholders, these are based on special information collected from those gas undertakings that are willing to furnish the same. The figures collected for the year 1914 refer to 1,281 private corporations and 320 local authorities. These 1,601 undertakings supplied 229,196 M. cubic feet of gas to 3,951,519 prepayment and 3,719,293 credit customers, also 779,442 public lamps, and more than half the consumers hire gas cookers. The carburetted water gas plant is stated to be equal to the production of 257 M. cubic feet of gas per 24 hours. For the year 1915, the returns include 1,263 corporations and 323 local authorities, who supplied 233,275 M. cubic feet of gas to 4,094,424 prepayment and 3,639,047 credit customers. About 170 undertakings make carburetted water gas, and the total productive capacity is increased to 280 M. cubic feet, or nearly 10%. The maximum annual productive capacity is no less than 102,200 M. cubic feet, or 44% of the total make. Comparing this figure with the actual quantity of carburetted water gas made, as above quoted, it would appear that in 1915 the carburetted water gas plant was worked only to an extent of less than 25%. The explanation is probably the high price at present obtaining for gas oil, and the large dem nd for coke.

SUBSTITUTE FOR GAS COAL.

The scarcity and difficulty of obtaining coal on the continent, owing to the war, has become acute that many gas works are compelled to shut down entirely. Matters have not approached such a condition in England, and the usual supply is maintained. In Denmark some practical experiments on the manufacture of gas from peat are claimed to have yielded results that are so far satisfactory as to induce the gas works in several important towns to resume operations, in the expectation of being able to use peat in place of coal. Large supplies of peat are available in that country, and the risk and delay attendant upon sea borne or long journey railway delivery, which is quite as acute as the actual scarcity of coal, can be avoided. Many gas engineers have experimented with peat, which has been recommended on the occasion of every coal famine within the last 50 years, but like tar burning and other special expedients, is not heard of between while. Its light and bulky character, and the large proportion of moisture that it obstinately retains, are serious practical difficulties. The gas yielded by peat is very inferior, both in respect to photometric and calorimetric value, and it contains a large quantity both of carbon monoxide and dioxide. Many large electricity generating stations in Germany are provided with power by means of gas engines running on peat gas, manufactured in a special type of producer, differing in design from the apparatus used for producing power gas from anthracite coal or coke. The Société Technique du Gaz in France is giving anxious attention to the question of substitutes for coal in the retort house, and it is obvious that materials of local origin are preferable, such for example as greasy or oily wastes from domestic or manufacturing operations. There is at present an excellent opportunity for the enterprising gentlemen who have more than once claimed to be in a position to make gas from sewage. A search for information has led to the discovery of a work dealing with the manufacture of gas from substances other than coal, published 50 years ago by a former president of the Société, M. Alfred Mallet. Inquiry as to the possible use of

resinous for woods has elicited the fact that such material has been used with satisfaction at Petrograd, and that the residual charcoal was salable, though not comparable with gas coke. Mixtures of coal oil and wood gas are being used in Australia, and the yield from wood alone is about 8,000 cubic feet of gas per ton. The objections mentioned in connection with peat apply in a lesser degree to all kinds of wood. Another gentleman has been able to use a large proportion of olive husks in conjunction with coal, and thus reduce coal consumption.

Daylight Saving.

Nearly the whole of the Continental Nations are considering daylight saving schemes, the essential feature of which is that the whole population shall rise and retire with the sun instead of some two or three hours later. In countries exposed to Zepplelin raids there is much to be said in favor of the scheme apart from the question of economy, but we must remember that daylight buys no material, employs no labor, earns no profits, and pays no taxes. The 7¼ million sterling balance of profit, above referred to, is at present subject to a 25% Income Tax, and any reduction on that amount, either by daylight saving or any other scheme means a 25% reduction in the contribution by the National income. Our War Bill of 5 millions sterling per day is not going to be met on the lines of reductions in manufacture and profit earning.

Evaporation of Naphthalene.

A paper dealing with the evaporation of Naphthalene in dry and in moist gas, read by Mr. J. S. G. Thomas, B. Sc. (of the South Metropolitan Gas Company), at a recent meeting of the London Section of the Society of Chemical Industry, is a valuable contribution towards the elucidation of an obstruse subject. Many years ago, M. Bremond recommended the drying of coal gas by passing it through an ordinary purifying box charged with quicklime, as a remedy for naphthalene troubles, and proved the efficiency of the plan in practice. That there is some connection between the quantity of moisture in the gas and the liability to deposit naphthalene, has long been a matter of common knowledge. Accumulations of this troublesome substance in the district main pipes are so commonly preceded by or associated with the precipitation of water, as to form a valuable aid to the experienced district inspector when he is called upon to locate and remedy the same. Frequently he knows exactly where to look for them. Gas as usually supplied may be considered as being saturated with water vapor, and therefore observations as to the vapor density of naphthalene or any other hydrocarbon in dry gas do not apply. Mr. Thomas finds that at ordinary temperatures, 32° to 85° Fah. the saturation vapor of naphthalene is less in moist than in dry gas, and that as the temperature rises from 32° the ratio decreases and more nearly approaches equality, while above 85° the saturation point, in the case of moist gas, is found to exceed that in dry gas. This explains why the naphthalene trouble is more pronounced during the summer than in winter, or coincident with the comparative warm days and cold nights that are experienced in the spring and autumn. The upper portion of the gas in a holder freely exposed to the sun for several hours, may acquire a temperature of 100° or more, and thus, apart from the increase of temperature be rendered capable of taking up more naphthalene than dry gas. Between the hour of dusk and midnight, nearly the whole of this gas may be distributed through many miles of main pipes, at a temperature of 45° or 50°, when the conditions are reversed, and the gas is less able to retain moisture, than a dry gas at a similar temperature. It also explains why the naphthalene content of the gas is always higher in hot weather.

N. C. G. A. June Meeting, New York.

The mid-year conference program of the National Commercial Gas Association on Thursday and Friday, June 8th and 9th to be held at The Auditorium, Consolidated Gas Company Building, 128 East Fifteenth street, New York, is announced as follows:

First Session.—General.

Thursday June 8, 2 P.M.

Opening of Conference—President Jansen Haines, DesMoines, Ia.

Address—Nathaniel T. Guernsey, New York.

Paper—"How the Gas Company and the Architect can Co-operate to the Best Advantage." D. K. Boyd, Philadelphia, Pa.

Discussion by prominent Architects and Members.

Domestic Science School Training, Its Effect on the Gas Business. T. M. Ambler, Brooklyn, N. Y.

Report of Committee on Reciprocal Relations with other Associations. C. R. Stull, Kingston, N. Y.

Second Session—Industrial.

Friday, June 9, 10 A.M.

Paper—"Industrial Fuel Business." W. A. Ehlers, New York.

Topical Discussions.

"How to Survey your Territory Properly and Record and Follow up the Business." Thomson King, Baltimore, Md.

"Selection, Training and Compehsation of Industrial Salesmen," G. M. Karshner, New York.

"How the Appliance Manufacturer can Assist in Securing Industrial Business." S. T. Willson, Brooklyn, N. Y.

"Standardizing Industrial and Engineering Data." G. W. McKee, Rockford, Iils.

Third Session—Educational.

Friday, June 9, 2 P.M.

Paper—"Education, the Basis of a permanent Industrial Preparedness" Dr. Lee Galloway, New York University. New York.

Topical Discussions:

"Should a Gas Company be Interested in Educational Work for its Employees?" P. S. Young, Newark, N. J. W. J. Clark, Mt. Vernon, N. Y.

"Why Should the Office Man take the Accounting Course?" J. L. Conover, Newark, N. J.

"How far can an Association go in Stimulating Work of the men and the Companies?" A. E. Forstall, 84 William St., New York.

"What can the Industrial Fuel and Power Salesmen get from the Course?" S. T. Willson, Brooklyn, N. Y.

"Is the General Salesmen's Course over the Head of the Average Gas Man?" J. M. Brock, Brooklyn, N. Y. C. H. French, Newark, N. J.

"How can We Help Men to Meet the Moral Requirements of Study?" G. A. Saunders, Mt. Vernon, N. Y.

"How to get in some Educational Work though Busy." W. H. Waterbury, Jersey City, N. J.

"How to Interest a Class." L. J. Platt, Newark, N. J.

"How can we Help Men to Meet the Physical Requirements of Study?" J. P. Zingg, New Jersey. G. W. Allen, Toronto, Ont. W. H. Logan, New York.

"What are the Advantages of Organized Class Work?" H. K. Dodson, Baltimore, Md.

"How can Executives be Brought to see the Advantages of Systematic Study by the Employee?" C. E. Paige, Malden, Mass.

"Introduction of the Educational Course into a Typical Gas Organization?" A. R. Beal, Poughkeepsie, N. Y.

"How do You Handle Incentives to do Educational Work?" George Smith, Weymouth, Mass.

"A Brief Description of the Educational Work of the Doherty Company" G. R. Trumbull, New York.

"In What Respects can the National Commercial Gas Association Work be of Value to the Maufacturer of Gas Appliances?" C. E. Bartlett, Philadelphia, Pa.

"Of What Benefit is the Illumination Course to the Gas Company Employee?" J. D. Lee, Jr., Philadelphia, Pa.

On Thursday, June 8, 10 A.M., at the Association Headquarters, 61 Broadway, New York, there will be meetings of the Board of Directors and of various committees.

Domestic Science Graduates Become Saleswomen.

Brooklyn Has 1,500 Women Canvassers.

T. M. AMBLER.

Some of the 7,500 Graduates in Domestic Science.

The Domestic Science Division of the Brooklyn Union Gas Company of New York City, has inaugurated a novel scheme for developing saleswomen from among the 7,500 graduates of the classes.

Since the opening of the Domestic Science School in their new quarters, at 180 Remsen street, the 1st of February, 1915, there has been a total audience of 55,532 women, 11,645 enrollments and 6,373 certificates were issued. Twelve hundred certificates were issued prior to 1915, making the number of certificate holders something over 7,500 to May 1st, this year.

Early in May letters were sent to all of these certificate holders, inviting a certain numder each day to the Domestic Science Rooms, to listen to the explanation of a scheme by which it was hoped that they would be able to earn a comfortable sum each month by devoting a certain portion of their time talking gas and gas appliances.

These various conferences resulted in the gas company securing something over 1,500 women as active agents in the territory controlled by the Brooklyn Union Gas Company, and also helped very materially to swell the sales during Gas Range Week, the total sales of this company during that week being almost equal to the total sales for the month of May, 1915, a large percentage of them being cash with the order.

The Sales Floor.—Everyone attending the Domestic Science Classes must pass through the salesroom.

The Mezzanine Floor.—Here the visitors are welcomed and students' enrolled.

An Effective Window at Orange, N. J.

A very effective yet inexpensive display was arranged in the show window of the Public Service Gas Company's office at Orange, N. J., during the week of May 8th-13th in which a comparison was made between the old coal and the new gas methods.

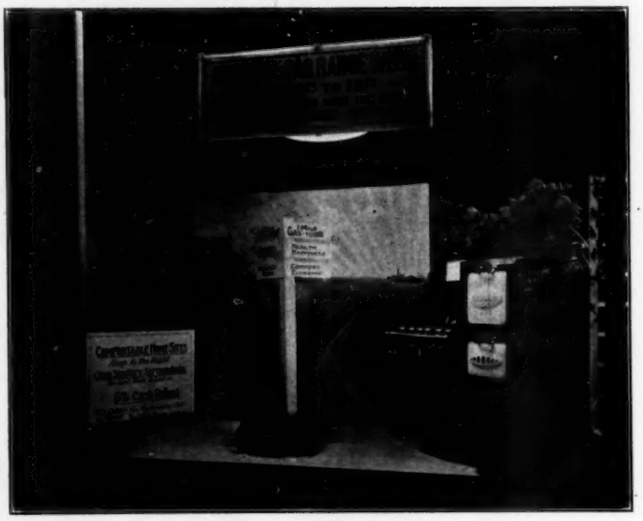
The scene represented a road leading to a smoky town to the left, "Coal Town," and another road to the right leading to a bright, clean-looking town, "Gas Town."

The hands on the sign post in the center points to the left reading "1 Mile to coal town—Expense, Extravagance, Drudgery;" and to the right "1 Mile to Gas Town—Health, Happiness, Comfort."

A cabinet range occupies a prominent position to the right, upon which is a price and descriptive card. A large bill board sign to the left reads: "Comfortable Home Sites, keep to the right, clean sanitary surroundings, etc.

Displays such as this serve to educate the public and therefore increase sales.

Mr. J. P. Zingg, the Local Agent, has been very active in window dressing and other merchandising efforts and the above illustrates another of his successes.



Publications.

Massachusetts Commission Report.—The annual report of the Board of Gas and Electric Light Commissioners of the Commonwealth of Massachusetts, is now available for distribution.

Among the gas companies whose production in 1915 greatly exceeded that of 1914, are the following:

	Cubic Feet	
	1915.	1914.
Beverly Gas & Electric Co	94,111,600	88,310,100
Brockton Gas Light Co	374,144,200	356,543,300
Cambridge Gas Light Co	949,124,000	934,312,000
Citizens, Nantucket	6,210,680	5,715,000
East Boston Gas Co	325,986,000	317,815,000
Fall River Gas Works Co	688,781,000	667,008,000
Fitchburg Gas & Electric Co	143,887,000	135,903,000
Greenfield Gas Light Co	42,933,700	37,847,700
Haverhill Gas Light Co	309,108,000	294,895,000
Lawrence Gas Co	528,272,400	509,397,500
Malden and Melrose Gas Light Co	812,902,000	763,620,000
New Bedford Gas and Electric Co	635,627,000	613,852,000
Old Colony Gas Co	67,871,000	61,281,200
Webster and Southbridge Co	53,117,000	47,633,750

All the four municipal gas plants in the State showed a gain in production:

	1915.	1914.
City of Holyoke	222,158,000	211,204,000
Town of Middleboro	5,004,000	3,984,000
Town or Wakefield	44,972,000	43,428,000
Town of Westfield	46,620,000	45,783,000

Among the larger companies, the company showing the smallest percentage of gas unaccounted for is the Lowell Gas Light Co., with .99%. That of the Boston Consolidated Gas Co., was 1.98%, as compared with 3.28% the year before. The largest percentage of loss was 17.78%, which was in the case of one of the smaller companies.

Natural Gas Proceedings.—One of the attractive features of the recent annual meeting of the Natural Gas Association at Pittsburgh, Pa., was the bound volume of papers, reports, wrinkles, etc., that were to come before the meeting. They include some 265 pages of matter and are well illustrated and arranged.

Safety Code.—A partial, preliminary report on the gas fitting section of the forthcoming Safety Gas Code of the Bureau of Standards, is available to managers of gas companies or others interested.

Hydrogen and its Industrial Application.—A short description of the several processes for the production of hydrogen and its use in connection with Quartz, Glass, Balloons, Platinum Melting, Synthetic Ruby and Sapphire, Hydrogenation of Oils and the Synthetic production of Ammonia, by Harry L. Barnitz, has been reprinted by the "Metallurgical and Chemical Engineering" in pamphlet form.

Uncle Sam Says.—Some time ago the Government issued a "Note" on Measurements for the Household, that contained considerable data, of general interest. Unfortunately it was only a bulletin of the Bureau of Standards, and not included in a speech of a Member of Congress, and instead of being "Franked" to 7,000,000 constituents, it was placed on file. The General Gas Light Company have rescued it from oblivion, and have made considerable of the data interesting by adding cuts, and reading matter showing how the Radio-X Lamp does all that Uncle Sam Says.

Hot Water.—Trade may or may not follow the Flag but orders must follow printed matter, to judge from the consistent and clever manner, with which the Baltimore Company handles this part of their work. The newest booklet has to do with the work of Herbert Dodson, "Keeping people in Hot Water." If the kind of people, who live in the kind of homes, illustrated in the booklet have Automatic Water Heaters, we want one also.

Architects Data Sheets.—In the paper on Merchandising, which appeared in our issue of May 22, p. 324, Mr. J. B. Myers called attention to the value of data for Architects and we are glad to note that the Company he represents believes likewise, as they have issued a number of Architects Data Sheets, in colors, giving information essential to Heater and Range installations, and some hints besides. Write to Advertising Department U. G. I. 13th and Cherry Streets for samples.

Catalogue De Luxe.—If the public can be made to take an interest in printed matter, especially as uninteresting as catalogues are reputed to be, the color work and "Live" illustrations, in the new catalogue of the Public Service Gas Company of New Jersey, will cause them to at least look it over. James P. Hanlan has one more "Strike" to his credit.

Personals and "Pep."—Getting the signature on the dotted line as Elbert Hubbard said is the sine-qua-non of successful salesmanship, and this seems to be the motto of the editor of the Monthly Bulletin of the United Gas & Electric Corporation. The May number tells what the sales force has accomplished, who did it, and in a measure, how. Only one "high-brow" technical dissertation appears in this number.

New Methods and Appliances.

PREHEATING BOILER-FURNACE AIR SUPPLY.—It has often been suggested that the warm exhaust air from turbo-generators be led to the boiler furnaces instead of being allowed to pass away unused. The intention is to utilize this warmed air instead of the comparatively cold air drawn in from the outside. This practice is now followed in some large plants.

The advantage of utilizing air already heated is a real one, since the higher the temperature to which this air is heated before entering the furnace, the higher, proportionally, will be the fire. Thus the increased temperature of the incoming air represents direct gain of heat.

Preheating the air supplied to the furnaces of boilers is a very old idea, and has been made use of extensively. The usual method is to install air heaters in the path of the flue gases, exactly as economizers for heating feed water are installed. In fact, both these pieces of apparatus perform the same function, namely, utilization of the heat of the flue gases that otherwise would be wasted.

Air heaters are not used to the same extent as economizers, because coals are not suitable, owing to the tendency to form clinker. Coals that give the most trouble from clinker are those with ash of a melting point around 2,400° F. Coals having an ash that does not melt below about 2,600° F. will give very little trouble. If the temperature of the incoming air be raised 200 to 300° F. by the use of preheaters, the temperature of the fire from the ash pit through would be increased proportionally, and thus a coal having a higher melting point for its ash would have to be used. For every 100° heating of the air supplied the furnace, the efficiency is increased about 3 to 4%, representing, therefore, a saving in fuel of about 5%. The gain in fuel consumption is thus very satisfactory, but the saving in operating expenses must be balanced against the possible higher cost of coal, cost of either forced draft or higher chimney, and troubles from clinkering. Natural draft is almost out of the question where air heaters or economizers are used, because of the friction losses, etc.

The use of the warm air from the turbo-generators is a different problem. The volume of air is large—about 3 to 4 cubic feet of air per minute per kilowatt of rating is needed—and this air goes to waste. The temperature increase is comparatively small, usually not more than 30 or 40° F., and, therefore, insufficient to cause trouble from clinkering. The savings in fuel and the over-all efficiency gained, are not very large, but are generally worth taking advantage of in a large plant.—*R. I. Elkin, in "Electrical World."*

ACTIVE DEMAND FOR ASBESTOS.—The United States marketed in 1915, 1,731 short tons of asbestos of domestic production, valued at $76,952. Compared with the production of 1914 this represents a gain of 484 tons, or 39% in quantity and 306% in value.

The asbestos of the world is supplied chiefly by Canada. Most of it is exported free of duty to the United States, the greatest manufacturer and user of asbestos products.

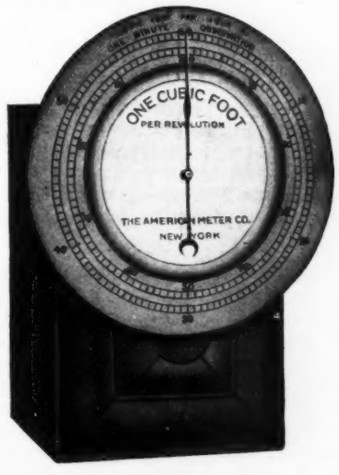
An order in council by the Government at Ottawa, Canada, March 25, 1916, placed an embargo on the shipment of asbestos from Canada to other than British ports, but permitted shipments to the allied countries, France, Russia, Italy, Japan and Portugal, on special licenses granted by the British consul. As this order absolutely shut out the United States consumers of asbestos and asbestos products, it was demonstrated to the Government at Ottawa that a great hardship on American manufacturers and consumers would be entailed, and the embargo has been modified to the extent of permitting shipments of crude asbestos to enter the United States if guaranties are given by the manufacturers and their consumers that none of the crude or manufactured material will be re-exported from the United States, except as provided for in the original order.

INCANDESCENT GAS-MANTLES OF PLUSH.—In a German Patent Journal, the "Ironmonger" (London, Eng.), reports: Herr Rudolf Langhans proposes to manufacture the fabric of gas-mantle from plush of suitable texture, instead of from ramie or cotton. The inventor claims that plush can be impregnated and burnt-off in the same way as the fabrics now in use. The incandescent body, in conformity with the texture of plush, would consist of a sieve-like woven basis, containing a very large number of impregnated and calcined glowing-threads—the minute channels running between these threads conducting the gas so that the gas mixture would not reach the texture vertically, as in the ordinary mantles, but parallel with the direction of the threads. The plush mantle is therefore, of quite different structure from those at present in use; while its capacity of emitting light is considerably greater without prejudice to its durability or its cost of production. The process of combustion in a plush mantle is as follows: The gas mixture, which issues from the close meshes of the basic texture as through a sieve, ignites on the surface of the mantle and burns in the channels which run parallel between the threads; while the flame must be so regulated as to end on a plane with the extreme edges of the threads, which in effect form the incandescent body. As the threads begin to glow, a strong light is emitted at their ends, which decreases towards interior. The basic fabric prevents back-lighting of the minute flame-particles into the channel. The inventor suggests that mantles made of this texture should be disc-shaped. For this purpose, the burner, which is of ceramic material, is formed like an inverted funnel closed by a kind of sieve. On the burner a disc-shaped mantle is fixed. Cylindrical or semi-spherical mantles can be made of plush, and the burner placed upright.

LARGE DIAL DEMONSTRATION DRY METER.—For the purpose of demonstrating the economical consumption of gas stoves, burners and industrial gas appliances, the American Meter Company is offering a new demonstration meter. It is a regular consumers' dry meter of the 2-diaphragm type, but instead of the usual index, this meter is fitted with a single large dial, finished in silver-white enamel, with black lines and figures, 13½" in diameter in the 5-light size. The dial registers 1 cubic foot per revolution and is divided into 100 parts.

The large hand moving over this dial indicates the actual consumption in hundredths of a cubic foot for the time elapsing during the test; so that by timing the hand for a minute, starting at zero, noting the point reached by the hand at the end of the minute and multiplying the amount indicated by 60, the hourly rate of consumption of the burner or appliance is obtained.

A dial can also be furnished which gives the above reading, and in addition has another circle, outside the one described, which indicates directly the hourly rate of consumption up to 60 cubic feet when timed for 1 minute from the zero point at the top. This makes a calculation unnecessary and gives a very clear and satisfactory demonstration of gas consumption.



The meter, if preferred, can be fitted with the style of index and dial, 6" in diameter, same as that used on wet test meters.

This dial, while much smaller than the large single 1 cubic foot dial previously described, will give not only the hourly rate and the amount actually passed in hundredths of a cubic foot, but will also register on four small inner circles the full amount passed during a long test or series of tests up to 10,000 cubic feet. The hands of the index are movable and can be readily set back to zero at the end of any run, if desired. These meters, fitted with any of these dials, can be furnished in any size, though the most generally used is the 5-light. They are handsomely finished in dull black, and are supplied with threaded elbow couplings for iron pipe connection and also with couplings for hose.

Items of Interest from Various Localities.

BY a vote of 23 to 56, the House of Representatives of Massachusetts refused to substitute for the adverse report, the bill recommended by the Gas and Electric Light Commission to abolish the sliding scale, if the Boston Consolidated Gas Company does not divorce itself from the holding company. A roll-call was refused. Representative Casey declared that the consumers would receive no more benefits from the sliding scale or reduction in price so long as the holding company swallows the profits. Representative Tolman said the bill would compel the Boston company to build new works, which would be a hardship this year.

A PROPOSAL to issue $350,000 bonds for a municipal gas plant, and $350,000 for a municipal electric plant, was decisively defeated by the voters of Sioux Falls, S. D., at the city election.

MANAGER John J. Kirkpatrick of the Holyoke, Mass., Municipal Gas and Electric Department, opened bids on May 16 for the yearly supply of gas oil and coal, but no awards were made. The principal reason for not giving out any contracts was the fact that the bids were about $30,000 higher than last year. Oil which cost about $21,000 last year, for the same amount this year will cost approximately $42,000. The coal needed may cost $10,000 more than last year for the same quantity. The quotations for gas oil last year was 3 cents a gallon, and now it is 6 cents a gallon. Coal showed an increase of 30 cents a ton over last year. Fourteen bids were received. Five firms were represented in the competition for the gas oil, and there were 9 coal bids. Manager Kirkpatrick issued notice of an increase of 25 cents a day to the men employed in the retort house at the gas plant. This will benefit about 20 men. Some are paid $2.25 a day and others receive $2.50.

THE Murphysboro (Ill.) Waterworks, Electric and Gas Company has been sold to the Southern Illinois Gas Company, of which Ira C. Copley of Aurora is president. The purchase price was $315,000. Franchises have also been acquired at Bartlett, Johnston and West Frankfort.

ANDREW LENDERINK, City Engineer of Kalamazoo, Mich., showed that during Gas Range Week, the average was 597 B. T. U's. Following is the schedule:

	A.M.	P.M.
May 8	577½	602
May 9	603	585
May 10	619	620
May 11	598	594
May 12	579	598
May 13	602	587

The franchise calls for 600. and the municipal ownership advocates are attempting to capitalize every shortcoming real or imaginary.

CORPORATION Counsel Harry J. Dingeman of Detroit, Mich., intimated strongly before the council committee on charter and city legislation, that the city may attempt to force lower rates from the Detroit City Gas Company, providing the proposed public utilities charter amendment is adopted next November. This intimation came in the corporation counsel's explanation of the proposed amendment, which incidentally was the only one to get by the committee. He told the alderman that the Michigan state railroad commission has asserted that it has the power to change the rates to be charged by a public utility company during the life of a franchise. "If that is so," said Dingeman "you would better put this proposed amendment on the ballot and if the voters adopt it we may have something to say to the gas company."

THE April meeting of the New Jersey Retail Ice Cream and Candy Manufacturers' Association was held in the spacious auditorium of the Public Service Gas Company, 84 Sip avenue, Jersey City, N. J. After the regular business had been disposed of, the meeting was turned over to Mr. G. E. Smith, representing the gas company. A number of informal talks on gas appliances, refreshments and entertainment concluded the meeting.

THE Welsbach Company announces that mantle ash is valuable and that they will pay 40 cents per ounce, $6.40 per pound for same. Transportation charges to be prepaid and shipment made direct to factory at Gloucester, N. J. Payment will be made by check direct to shipper upon verification of weights and purity. The ash must be packed in perfectly tight containers to prevent loss en route, and the packages plainly marked with name and address of shipper, as well as mail advice of shipment addressed direct to their office.

A. R. TODD, of the Michigan State Food and Weights and Measures Department, protests against the quality of gas furnished by the Michigan Light Company, at Flint, inasmuch as one of the State institutions is located there. Mr. Todd states that three tests made on the one day showed that the gas had heat units of 551, 557 and 567 per cubic foot. He says that he understands the city has a contract wherby the standard of gas which the company is supposed to furnish the city is 680 heat units per cubic foot.

ALREADY 2 miles of the 20 miles that must be traversed by the Pittsfield (Mass.) Coal Gas Company, in getting its service into Lenox and Lee, have been "annihilated." The summer visitors will be able to cook with gas.

FIVE suits were recently filed in the district court against the Utah Gas and Coke Company of Salt Lake City, for damages aggregating $22,750. Damage to property by reason of the operation of the company's plant is charged. The plaintiffs and the amount each ask are, W. J. Thomas, $4,000; Daniel Booth, $1,750; W. A. Langford, $4,000; Charles C. Langley, $9,000; J. F. Keim, $6,000.

EDWARD W. BEMIS, gas expert for the Chicago, Ills., Council Committee on Gas, Oil and Electric Light, told members of the committee that a change in gas standard from the candle power unit to the heat unit, as advocated by Samuel Insull and other officials of the Peoples Gas Light and Coke Company, would mean in effect an increase of 10 cents per 1,000, because the proposition of the company would mean giving the people a cheaper grade of gas. The present standard of candle units is equivalent to 670 thermal units. The company asks to have a standard of 565 units established. He says that, that means poorer gas.

A PETITION from the city of Rockford, Ills., was filed with the Illinois Public Utilities Commission, on May 15, for an investigation as to whether the present gas rate of 90 cents per 1,000 cubic feet, charged consumers by the Rockford Gas Light and Coke Company, was not excessive. Davenport, East St. Louis and Waukegan are also getting uneasy, and cannot understand why they should not have 75 cent gas the same as Springfield.

A $2 000.000 subsidiary plant of the Milwaukee (Wisc.) Coke and Gas Company was formally dedicated on Sunday afternoon, May 14. The plant is situated in Carrollville, two miles beyond South Milwaukee, and will comprise fifteen separate buildings of which five have already been completed. The institution covers 150 acres. It is situated near the lake shore and will employ about 2,000 men. It will be known as the Newport Hydro-Carbon Company. It will make all the by-products of coal, including coke, coal tar dyes. napthalene, carbolic acid and the rest of the series.

AS the Niagra Falls (N. Y.) Gas & Electric Company has agreed to extend its gas mains to the plant of the Wahl Printing & Binding Company in Niagara Falls, the Wahl Company has withdrawn its complaint before the Public Service Commission.

AT a meeting of Fairport (N. Y.) Chamber of Commerce, held in Odd Fellows Hall, May 15, the matter of installing a gas system in the village was discussed. A. C. Thompson of Brockport, addressed the meeting. The Despatch Heat, Light and Power Company has applied for a franchise to operate there.

THE Gas and Electric Construction Company of Minneapolis have made an application for a franchise at Hutchinson, Minn., and at Sheldon, Ia.

THE Souderton, Pa., Borough Council has adopted the ordinance granting permission to the Philadelphia Suburban Gas and Electric Company to lay mains and furnish gas.

THE Elkhart (Ind.,) Gas and Fuel Company has planned $15,000 of improvements for this summer, which includes the extensions of 5 miles of mains. The work will be delayed 6 to 8 weeks, because of the inability to get the pipe from the mills.

JOS. NEEDHAM, President of the Needham Gas Appliance Co., nc., announces that within a short time they shall have a compressor and several high and low pressure devices working at the laboratory, 550 West 25th street, New York city.

IN an application filed with the California Railroad Commission on May 11, the Southern Counties Gas Company asks authority to purchase the gas properties of the Southern California Edison Company and the Long Beach Consolidated Gas Company, serving some twenty cities in Southern California. This application reveals a slight change in plan announced in the JOURNAL for the big Southern California Gas Company merger, which in effect is only a change in the corporate name. In the prior application it was proposed to merge all the southern companies under the name of the Peoples Gas Company of California. Now it is explained it has been deemed to be more expeditious for the Southern Counties Gas Company, which is the big operating company, to acquire the other properties under its own name and thus save considerable time which otherwise would be consumed by legal steps in effecting the merger. It is hinted that later the change of name to the Peoples Gas Company will be made. The application asked that the Southern Counties Gas Company be authorized to issue $2,500,000 bonds and $660,000 of 6% preferred stock. The bonds and stock will be sold to yield $3,000,000. With this money the purchase of the gas properties will be made by the Southern Counties Gas Company. The documents filed indicate that the company has made arrangements to raise the $3,000,000 necessary to complete the deal.

MISS ETHEL UGLOD ELLIOT, daughter of Dr. and Mrs. Arthur H. Elliott, of 49 Whitestone avenue, Flushing, was married May 20 to Searle Hendrickson of Palmerton, Pa.

GEORGE H. HOLDEN, president, has retired from the G. S. Blodgett Company, Burlington, Vt., and John S. Patrick, secretary and treasurer of the company, assumes entire control. This business was established in 1847 and incorporated in 1892. The company manufacturers the Blodgett portable baking oven. Mr. Patrick has been with the company for 25 years. In addition to being sole owner of the G. S. Blodgett Company, he is the treasurer and director of the Magnesia Talc Company, with other important business connections.

WE were shocked to learn of the untimely death of Mr. Walter H. Phillips of Montpelier, Vt., due to his exertions in the heroic rescue of his five-year-old son, Wendell, from the waters of Groton Lake near Montpelier, Vt., Sunday morning, May 14. Mr. Philips was manager of the Montpelier Gas and Electric Company of Montpelier. He had been in charge of that office for two years, going there from Malden, Mass. He first entered the employ of that concern eleven years ago at Haverhill, Mass., to which city he went from Dover. Here he was employed for a number of years as cashier for the Dover, Somersworth & Rochester Street Railway under the superintendency of A. B. Leighton. He left Dover in the spring of 1905, a short time after his marriage to Miss Martha Staples. She survives him as do three daughters and the son for whom he sacrificed his life. He also leaves a father, a resident of California, and two sisters one of whom resides in Malden. In Montpelier he was prominent in society and civic affairs, being a member of the Apollo Club and the Montpelier Choral society.

THE funeral of Michael Connor, for 60 years a resident of Roxbury, Mass., and for half a century an employee of the Boston Consolidated Gas Company and its predecessors, was held May 18th, at 8.30 at his home, 9 Woodville St. At 9 o'clock a solemn high mass of requiem was celebrated in St. Patrick's Church on Dudley Street. Mr. Connor leaves three sons and two daughters.

A. L. ENGLISH,

Retiring President, Iowa District Gas Association.

THE retiring President of the Iowa District Gas Association, whose address appeared in our last issue, entered the gas and electric business 28 years ago, in a small electric plant at York, Neb., from which he went to the Omaha Electric Light and Power Company, where he held several positions for about 15 years, and was then transferred to Council Bluffs, Ia., as Manager of the Citizens Gas and Electric Company, which position he has held for a little over 11 years. He is a member of the following associations: American Gas Institute, National Commercial Gas Association, Iowa District Gas Association, and the National Electric Light Association. Mr. English is another example of the American idea, work begets success.

MR. ABBOTT A. LAUGHTON, who contributes an article in this issue and who has for several years been local manager of the Gardner Gas, Fuel & Light Company and local manager of the Athol Gas & Electric Company, has been advanced to the position of district manager for these companies, and is to be elected a director in the Gardner Gas, Fuel & Light Co.

THE incorporators of the Racine (Wis.) Piano Bench Company are S. B. Way, D. E. Callender and Emil Jorgenson, Vice-President, Manager and Auditor, respectively of the Wisconsin Gas and Electric Company. The company will make all kinds of piano and specialty seats.

E. H. Barber, engineer of the Massachusettes Gas and Electric Light Commissioners, was the speaker at the annual meeting of the Concord, Mass. Trinitarian church, May 9. The following officers were elected for the coming year. Benjamin Moody, pres., W. B. Conant, vice pres., Oscar Beckvold, Concord, sec. and W. A. Stevens, treas. An article by Mr. Conant appears in other columns.

MR. NELSON G. PHELPS, for some time connected with the Gilbert & Barker Manufacturing Company, has been appointed Industrial Fuel Engineer of the Laclede Gas Light Company of St. Louis, Mo.

MR. H. C. STEVENSON, of the Detroit (Mich.) City Gas Company, has been elected a Director of the Detroit Association of Credit Men.

MR. BYRON T. GIFFORD, chief engineer of the American Public Utilities Company, Grand Rapids, Mich., has been elected President of the National District Heating Association Mr. Gifford's earlier work was in the heating field and he is the author of a book and several papers on the subject.

M. A. BOURNOVILLE and W. H. Roffmassner have been re-elected trustees of the Northern Liberties Gas Company of Philadelphia, Pa.

IT is with pleasure we announce that our friend and the friend of many of our subscribers, Mr. Louis Nathaniel Rancke, was married to Miss Hazel Allison Jones, on Thursday, May 18. Mr. and Mrs. Rancke will be at home after June 1st, at Laoconing, Md.

Financial Notes.

H. M. BYLLESBY has returned from a two weeks' inspection of the California properties managed by H. M. Byllesby & Company. He was accompanied by Vice-President O. E. Osthoff and W. H. Clarke, manager of the bond department.

APRIL gross earnings of the COLUMBIA GAS AND ELECTRIC COMPANY increased $66,992; net increase, $45,048; surplus after charges, increased $36,982.

REPUBLIC RAILWAY AND LIGHT report as follows:

April	1916.	1915.	Increase
Gross	$327,672	$237,746	$89,926
Net	128,392	85,961	42,431
Surplus after charges	60,053	30,970	29,083
From Jan. 1.			
Gross	$1,286,494	$1,141,589	$144,910
Net	532,620	351,937	180,683
Surplus after charges	262,694	130,837	131,857

BROOKLYN UNION GAS, quarterly, 1½%, and usual extra semi-annual 1%, will be payable to holders of record June 15.

LACLEDE GAS, semi-annual, 2½% preferred and quarterly, and 1¾% common, will be payable June 15.

PACIFIC GAS & ELECTRIC reports for April gross earnings $1,486,528, a decrease of $25,575; total net $627,481; a decrease of $53,492, and balance for dividends $291,313, a decrease of $33,327. For four months to April 30 gross earnings were $6,364,435, an increase of $103,005; net earnings $2,864,163, a decrease of $1,731; balance for dividends $1,507,496, an increase of $102,166, and surplus after dividends on preferred and common stocks $630,755, an increase of $72,405.

THE combined net earnings available for dividends of the MASSACHUSETTS GAS COMPANIES for April were $270,673, an increase of $30,477 or 12.09% as compared with the corresponding month a year ago. Following are the April earnings in detail with comparisons:

Gas Department:	1916	1915	1914
Boston	$125,272	118,263	107,162
Newton	6,138	5,980	5,521
Quincy	1,560	1,736	1,065
East Boston	1,252	4,271	4,091
Totals	134.223	130,251	117,839
Coal Department:			
New England Coke	74,249	39,086	64,624
New England Coal	50,250	50,573	40,835
Boston Tow Boat	6,014	9,584	3,171
Federal Coal	5,934	10,699	4,428
Totals	136,449	109,944	113,060
Grand totals	270,673	240,195	230,902

THE CITIES SERVICE COMPANY reports April earnings as follows;

	Month of April, 1916.	Month of April, 1915
Gross earnings	$638,491.91	$342,336.82
Expenses	20,670.05	15,297.85
Net earnings	$617,821.86	$327,038.97
Interest on notes and debentures	41,631.62	40,833.33
Net to stock	$576,190.24	$286,205.64
Dividends Pf. Stock Paid and Accd	169,573.12	138,833.00
Net to common stock	$406,617.12	$155,372.64
Net to surplus and reserve	406,617.12	155,372.64

BLACKSTONE VALLEY GAS AND ELECTRIC COMPANY have declared a semi-annual dividend, $3 a share, preferred and quarterly, $2 a share, common; both payable June 1, to stock of record May 22.

DIRECTORS of the LOUISVILLE GAS & ELECTRIC COMPANY declared a quarterly dividend of 1½% on the preferred stock of the corporation at a meeting held May 18, at the company's offices. The dividend will be payable June 1. Arthur S. Huey, of Chicago, vice-president of the company, attended the meeting.

GOVERNOR WHITMAN has signed the bill authorizing an eighty cent gas rate in the Thirtieth and Thirty-first wards of Brooklyn, New York City. The bill was introduced by the Thompson Public Service Commission Investigating Committee and affects the Kings County Lighting Company and the Brooklyn Borough Gas Company.

A GAIN of more than 12% or nearly $370,000, in gross business for April as compared to April, 1915, is shown in a financial report just issued by PUBLIC SERVICE CORPORATION OF NEW JERSEY. For the 4 months ending April 30, the increase in business has been more than $1,500,000 or nearly 14%. The figures follow:

	April 30, 1916.	Four months ending April 30, 1916.
Gross increase in total business	$369,992.42	$1,599,234.82
Percentage of increase	12.8%	13.6%
Balance available after payment of operating expenses, fixed charges, sinking fund requirement, etc., for amortization, dividends and surplus	$350,037.77	$1,562,965.71
Increase in surplus available for dividends over corresponding month 1915	$84,322.84	$387,879.84

Current Prices of Public Utility Securities.

	Bid.	Asked.
American Gas Co	120	122
*American Gas & Electric	147	150
*American Gas & Electric pf	52	52
American Light & Traction	390	395
American Light & Traction pf	110½	112½
American Power & Light	65	67
American Power & Light pf	85	86½
American Public Utilities	44	47
American Public Utilities pf	76	79
Associated Gas & Electric pf	55	65
Atlantic P. & L. pf	92	95
Brooklyn Union Gas Co	127	130
Cities Service	275	290
Cities Service pf	88	89
Colorada Power	25	26
Colorado Power pf	99½	101
*Commonwealth Pr., Ry. & Lt	64½	65
*Commonwealth Pr., Ry. & Lt. pf	84½	86
Consolidated Gas Co	139	140
Denver Gas & Electric gen. 5s	97	99
Electric Bond Deposit pf	82	84
Electric Bond & Share pf	99½	100
Federal Light & Traction	11	13
Federal Light & Traction pf	45	49
Gas & Electric Securities	210	220
Gas & Electric Securities pf	90	95
Laclede Gas	106½	107
Northern States Power	68	69
Northern States Power pf	96	97½
Pacific Gas & Electric	57½	58
Pacific Gas & Electric, original	91½	93
Pacific Gas & Electric 1st pf	89	90
Public Service	131	131¼
Republic Ry. & Light Co	29	31
Republic Ry. & Light Co. pf	76	79
Southern California Edison	88	90
Southern California Edison pf	104½	106
*Standard Gas & Electric	13½	14
*Standard Gas & Electric pf	36½	37
Tennessee Ry., Light & Power	11½	12½
Tennessee Ry., Light & Power pf	52	53
Toledo Trac., Light & Power	40	42
Toledo Trac., Light & Power pf	80	85
*United Gas Improvement Co	88	89
United Light & Railways	51	53
United Light & Railways 1st pf	76½	78
Western Power	16¼	17
Western Power pf	64¼	65

*Par value $50